

CLAIMS

1. A hollow auger head assembly for penetrating geological formations, the hollow auger head assembly comprising:

5 a) a hollow auger head configured such that it can be secured to a conventional auger used for drilling; and

b) at least two drill bit assemblies secured to the hollow auger head, each drill bit assembly comprising: a drill bit body having a means of attachment, at least one  
10 finger bit secured to the underside of the drill bit body, and at least one blade secured to the front edge of the drill bit body.

2. The apparatus of Claim 1 wherein the blade is secured to the drill bit body by brazing, soldering or  
15 welding.

3. The apparatus of Claim 1 wherein the blade is secured to the drill bit body by bonding.

4. The apparatus of Claim 1 wherein the blade is made of hardened material.

20 5. The apparatus of Claim 1 wherein the drill bit assemblies have pieces of hardened material secured along the outside edge of the drill bit body.

6. The apparatus of Claim 5 wherein the pieces of hardened material are secured to the outside edge of the drill bit body by brazing, soldering or welding.

7. The apparatus of Claim 5 wherein the pieces of  
5 hardened material are secured to the outside edge of the drill bit body by bonding.

8. The apparatus of Claim 1 wherein the drill bit assemblies have pieces of hardened material secured along the front edge of the drill bit body.

10 9. The apparatus of Claim 8 wherein the pieces of hardened material are secured to the drill bit body by brazing, soldering or welding.

10. The apparatus of Claim 8 wherein the pieces of hardened material are secured to the drill bit body by  
15 bonding.

11. The apparatus of Claim 1 wherein each finger bit is positioned on the drill bit body such that the cutting edge is at a negative angle to the front edge of the drill bit body.

20 12. The apparatus of Claim 1 wherein the method of securing the drill bit assembly to the hollow auger head comprises a bracket set secured to the outside of the hollow auger head and means for securing the drill bit assembly to the bracket set.

13. The apparatus of Claim 12 wherein the securing means for securing the drill bit assembly to the brackets comprises a bolt and nut made of a rust-resistant material.

14. The apparatus of Claim 12 wherein:

- 5       a) the bracket set comprises: a back bracket, a lower bracket having at least one through-material hole, and an upper bracket having at least one through material hole, a protruding finger along the front edge, and a recessed curved slot along the front edge; and
- 10       b) the drill bit assembly has a drill bit body further comprising an inward facing protruding finger and a receptacle in opposite positions from the receptacle and finger on the upper bracket such that they can be interlocked.

15       15. The apparatus of Claim 12 wherein the bracket set is secured to the hollow auger head by brazing, soldering, or welding.

20       16. A hollow auger head assembly for penetrating geological formations, the hollow auger head assembly comprising:

- a) a hollow auger head configured such that it can be secured to a conventional auger used for drilling;
- b) at least two drill bit assemblies comprising: a drill bit body having at least one through-material hole,
- 25       at least one finger bit secured to the underside of the drill bit body, each finger bit being positioned on the

drill bit body such that the cutting edge is at a negative angle to the front edge of the drill bit body, and at least one blade made of hardened material secured to the front edge of the drill bit body;

5        c) at least two bracket sets secured to the outside of the hollow auger head equidistant from each other around the circumference of the hollow auger head; and

      d) means for securing the drill bit assembly to the bracket set.

10        17. The apparatus of Claim 16 wherein the securing method for securing the drill bit assembly to the brackets comprises a bolt and nut made of a rust-resistant material.

      18. The apparatus of Claim 16 further comprising:

15        a) a bracket set comprising a back bracket, a lower bracket having at least one through-material hole, and an upper bracket having at least one through material hole, a protruding finger along the front edge, and a recessed curved slot along the front edge; and

20        b) a drill bit body having an inward facing protruding finger and a receptacle in opposite positions from the receptacle and finger on the upper bracket such that they can be interlocked.

25        19. The apparatus of Claim 16 wherein the bracket set is secured to the flight drive auger head by brazing, soldering, or welding.

20. The apparatus of Claim 16 wherein the blade is secured to the drill bit body by brazing, soldering or welding.

21. The apparatus of Claim 16 wherein the blade is  
5 secured to the drill bit body by bonding.

22. The apparatus of Claim 16 wherein the drill bit assemblies have additional pieces of hardened material secured along the outside edge of the drill bit body.

23. The apparatus of Claim 22 wherein the additional  
10 pieces of hardened material are secured to the outside edge of the drill bit body by brazing, soldering or welding.

24. The apparatus of Claim 22 wherein the additional pieces of hardened material are secured to the outside edge of the drill bit body by bonding.

15 25. The apparatus of Claim 16 wherein the drill bit assemblies have additional pieces of hardened material secured along the front edge of the drill bit body.

26. The apparatus of Claim 25 wherein the additional pieces of hardened material are secured to the drill bit  
20 body by brazing, soldering or welding.

27. The apparatus of Claim 25 wherein the additional pieces of hardened material are secured to the drill bit body by bonding.

28. A method of penetrating geological materials using a hollow auger head assembly comprising the steps of

a) attaching the hollow auger head assembly to an auger of a drilling rig, the hollow auger head assembly  
 5 comprising a standard-size hollow auger head to which at least two bracket sets have been secured and a drill bit assembly attached to each bracket set, the drill bit assembly comprising a drill bit body to the underside of which at least one finger bit has been attached and to the  
 10 front of which a blade of hardened material has been attached;

b) inserting the drilling rig and attached hollow auger head assembly into the geological formation;

c) rotating the drilling rig and attached hollow  
 15 auger head assembly in the geological formation;

d) breaking up the geological formation with the hollow auger head assembly;

e) feeding the broken up geological formation from the finger bit on the first drill bit assembly to the blade  
 20 of the second drill bit assembly on the on the hollow auger head;

f) further breaking up the geological formation with the blade of the second drill bit assembly; and

g) moving the broken-up geological formation up over  
 25 the top of the second drill bit assembly on the hollow auger head assembly, up the auger and away from the drilling area.